

**Claims:**

1. A composting system including a generally vertically-orientated vessel comprising a top wall, base wall and side wall(s) defining an interior vessel space. The composting system includes a range of mechanisms attached to a vertically oriented  
5 central rotating shaft, preferably including rotatable size reduction blade(s), agitation mechanism(s), and discharge blade/mechanism(s). The composting system includes internal size reduction means for reducing the size of waste and/or organic material introduced to the vessel. The composting system includes a loading hatch through which material may be introduced into the vessel, a discharge hatch  
10 through which material may be removed from the lower region of the vessel, and a source of air to maintain aerobic conditions within said vessel. When the apparatus is in use, material introduced to said vessel moves from the upper region of the vessel through a zone of size reduction to the lower region of said vessel gravitationally and via agitation. Process conditions within the vessel are controlled  
15 via intervention by an operator and via electronic control mechanism, which can monitor operating conditions such as temperature and loading rate (for example), to manage air injection, mechanical agitation and size reduction such that composting proceeds efficiently and at an optimal rate.
- 20 2. A composting system as claimed in claim 1 wherein the vessel is generally orientated vertically and is constructed of any suitable material, but is preferably constructed internally of stainless steel or like corrosion-resistant material. The walls, and particularly the side wall(s), are preferably insulated so as to retain heat generated by aerobic composting of introduced waste material.  
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3. A composting system as in claim 1 or claim 2 wherein all materials loaded into the unit pass through a zone of size reduction. The size reduction means also assists in the thorough mixing of the introduced material. The apparatus is preferably arranged so that all waste material must pass through the size reduction means  
30 when passing from the upper region to the lower region of the vessel.

4. A composting system as claimed in any of the preceding claims wherein the size reduction means is located internal to the composting vessel, and preferably comprises a plurality of "blades" or cutting edges. The blades do not necessarily need to be sharp as the size reduction may be achieved through mechanical shearing and tearing. The blades may therefore take the form of flat bars, preferably but not necessarily with bevelled edges and/or sharp edges. Preferably, at least one of the blades or cutting edges is adapted for movement (eg by generally horizontal rotation). More preferably, the size reduction means comprises a number of horizontally rotatable blades, preferably associated with a number of fixed horizontally disposed blades. The blades or cutting edges may be constructed of any suitable material, but are preferably constructed of stainless steel or like corrosion-resistant material.
5. A composting system as claimed in claim 1 where the material can be fed into the apparatus continuously or semi-continuously generally into the top of the vessel and discharged generally from the bottom of the vessel after the required residence (processing) time.
6. A composting system as claimed in any of the preceding claims wherein the chamber contains a loading hatch that may be located in the side wall(s) adjacent to the top wall, but more preferably, is located in the top wall (ie. roof) of the vessel. Preferably, the loading hatch, when closed, forms an air-tight seal to prevent escape of any odourous gas or "process air" from the vessel.
7. A composting system as claimed in any of the preceding claims wherein the discharge hatch may be located in the side wall(s) adjacent to the base wall, but more preferably, is located in the base wall of the vessel. Preferably, the discharge hatch, when closed, forms an air-tight and liquid seal to contain and/or prevent escape of any odourous gas, process air and liquids (ie leachates) from the vessel.
8. A composting system as claimed in any of the preceding claims wherein the apparatus (ie. vessel) is provided with a source of air containing oxygen (eg compressed air), to maintain aerobic conditions within the vessel. Air supply may be controlled via manual intervention by the operator, and more preferably automatically operated via a timer and/or other suitable electronic control mechanism such as temperature sensor(s) within the vessel.

9. A composting system as claimed in any of the preceding claims wherein the apparatus is provided with at least one outlet, to discharge odourous gas or process air from within the vessel. This process air may be discharged to the atmosphere or treated via an odour scrubber (or equivalent) to remove any odourous gases.
10. A composting system as claimed in any of the preceding claims wherein a centrally mounted and generally vertical rotatable shaft is located within the vessel. A range of mechanisms are attached to this central rotating shaft, preferably including rotatable size reduction blade(s), agitation mechanism(s), discharge blade/mechanism(s). The centrally located shaft being mounted in a generally vertical arrangement, causing the attached mechanisms to rotate in a generally horizontal plane with rotation of the shaft.
11. A composting system as claimed in claim 10 wherein the rotation of the centrally mounted shaft is driven by any suitable means (eg electric or other drive motor), and may be controlled via manual intervention by the operator, and more preferably automatically operated via a timer and/or other suitable electronic control mechanism.
12. A composting system as claimed in claim 10 or in claim 11 wherein one or more mixing blades or bar(s) may be mounted to the central shaft to agitate the material in the vessel to ensure even and consistent flow of materials through the vessel.
13. A composting system as claimed in claim 10 or in claim 11 wherein one or more sweeper blades or bar(s) may be mounted to the central shaft adjacent to the internal base wall of the vessel to agitate and/or sweep the material in the lower portion of the vessel towards and out of a discharge hatch.
14. A composting system as claimed in any of the preceding claims wherein the drive motor preferably operates the rotatable shaft both in a clockwise and anti-clockwise direction, and all rotating bars and blades are preferably symmetric in plan view to allow for effective action in both directions.

15. A composting system as claimed in any of the preceding claims wherein materials loaded into the unit via the loading hatch may be loaded manually by an operator, and more preferably automatically loaded via a suitable mechanical lifting apparatus powered via electrical or other drive motor.
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16. A composting system as claimed in claim 1 preferably as substantially hereinbefore described with reference to the accompanying drawings.